The Ralph Report Depreciation Proposals and Investment Neutrality

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THE RALPH REPORT DEPRECIATION PROPOSALS AND INVESTMENT NEUTRALITY

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Abstract: The Review of Business Taxation chaired by Mr John Ralph has suggested sweeping changes to business taxation in Australia. In particular it has been proposed that accelerated depreciation provisions be removed to finance a reduction in the company tax rate. If some degree of accelerated depreciation is to be retained, it is suggested that this should involve a uniform loading on depreciation rates for all assets. The aim is to provide a more uniform treatment of assets with different economic lives. This paper examines the neutrality of these proposals for unincorporated enterprises and companies owned by Australian shareholders. It is shown that with positive inflation, the proposal to remove accelerated depreciation altogether would provide a bias favouring longer-lived assets. In the absence of inflation a system of uniform loadings would provide a bias favouring shorter-lived assets although at very low rates of inflation, this bias can be reversed. The biases created by a system of non-accelerated depreciation or a system of uniform loadings would, however, be small relative to those created by current depreciation provisions.

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1. Introduction

The 'Review of Business Taxation' chaired by Mr John Ralph in its two volume document *A Platform for Consultation* (hereafter the Ralph Report) has suggested sweeping changes to business taxation in Australia. These include amendments to capital gains tax provisions, the elimination of accelerated depreciation, and a reduction in the company tax rate from 36 per cent to 30 per cent.

A particular problem with current Australian accelerated depreciation provisions identified in the Ralph Report is the way in which these are not neutral with respect to the economic lives of assets. Other things equal, it appears attractive for all forms of investment to be taxed as neutrally as possible so that the tax system does not divert investment away from areas providing higher pre-tax returns to areas providing lower pre-tax returns. If the tax system biases investment decisions, this will tend to reduce national income relative to what would be the case if the same amount of capital were invested but tax provisions were more neutral.

In the Ralph Report, concern is expressed that as an asset's effective life increases, the difference between the economic life and the period over which depreciation can be written off for tax purposes increases.[1] It is argued that this tends to favour longer-lived equipment relative to shorter-lived equipment.

There is scope for confusion over whether the concern being expressed in the Ralph Report is about absolute or proportionate differences between economic lives and tax write-off periods. However, final policy recommendations make clear that it is proportionate rather than absolute differences that are of concern to the report's authors. It is argued that if some element of accelerated depreciation is to be retained, there should be a uniform proportionate accelerated loading for all assets to produce a 'more uniform treatment of wasting assets with different economic lives'.[2] This would make the proportionate difference between economic lives and tax-write-off periods the same for all assets. It should be noted that the report does not claim that this would make the treatment of assets with differing economic lives completely uniform. However, the text gives the strong impression that there should be the same proportionate difference between economic lives and tax-write-off periods to make the tax system as neutral as possible for assets with differing economic lives.[3]

The way that the Australian tax system affects incentives to invest for unincorporated enterprises and widely-held Australian-owned companies has been examined in Benge (1998). In line with concerns expressed in the Ralph Report, Benge (1998) finds that longer-lived equipment tends to be advantaged relative to shorter-lived equipment (other than very short-lived equipment with economic lives of less than three years).[4]

This paper draws on the analysis in Benge (1998) to consider the effects of eliminating accelerated depreciation. If tax depreciation schedules were to mirror economic depreciation *and there were no inflation*, this would eliminate biases between assets with different economic lives. This is a well-known consequence of economic depreciation which follows from the invariance proposition of Samuelson (1964). In the presence of inflation, the proposal to eliminate accelerated depreciation would not be neutral with respect to assets with differing economic lives. The cost of capital (ie, the minimum real pre-tax rate of return at which investment becomes profitable) will tend to be lower for assets which depreciate more slowly. This means that the tax system will tend to be biased in favour of 'longer-lived' assets.[5] In this paper the sizes of these biases are assessed and it is concluded that they are small relative to current biases at low rates of inflation.

This paper also examines the effects of introducing uniform loadings for all assets. It is shown that contrary to the impression given by the Ralph Report, this would not be neutral with respect to economic lives. In the absence of inflation, it would tend to favour shorter-lived relative to longer-lived assets. By contrast, it is shown that a scheme suggested by Harberger (1980) would be neutral with respect to economic lives. This scheme will be referred to as the neutral investment scheme of Harberger (NISH). Harberger's scheme works by allowing some fraction of capital costs to be expensed (deducted immediately) with the remaining fraction being subject to economic depreciation. It is well known that expensing and economic depreciation are both neutral with respect to asset life. As Harberger points out, his scheme is neutral because it is a combination of two neutral schemes.

If the inflation rate is positive, for the NISH to be neutral it would be necessary to combine expensing with either real or nominal economic depreciation.[6] If the fraction of expenditure that cannot be expensed is subject to historical cost non-accelerated

depreciation (HCNAD), the NISH would no longer be neutral and would tend to favour longer-lived equipment. Relatively low rates of inflation can also reverse the bias created by a uniform loading and lead to a favouring of longer-lived assets. Even with low rates of inflation, there is no longer a presumption that a combination of expensing and HCNAD would lead to more neutral outcomes than uniform loadings. Estimates are made of costs of capital under these two possible schemes to examine their neutrality. It is shown that at quite low rates of inflation, the Ralph Report's proposal of uniform loadings may be no more distorting than attempting to apply the NISH by combining expensing and HCNAD.

The structure of this paper is as follows. Cost of capital expressions are derived in section 2 and it is shown that the elimination of accelerated depreciation would not completely remove tax biases in the presence of inflation. HCNAD would lead to a tax bias favouring assets which depreciate more slowly. Investment biases for unincorporated enterprises and Australian-owned widely-held firms are examined in section 3 where it is shown that biases produced by HCNAD are small relative to current biases. The effects of uniform loadings and the NISH are examined in section 4 on the assumption of no inflation. It is shown that uniform loadings would tend to bias investment in favour of shorter-lived assets whereas the NISH would be neutral with respect to asset life. In section 5 numerical estimates are provided to compare the effects of uniform loadings and the NISH assuming a combination of expensing and HCNAD. It is shown that with small levels of inflation there is no presumption that the NISH is less distorting than uniform loadings. Concluding comments are provided in section 6.

2. Effects of Eliminating Accelerated Depreciation

Firms have incentives to invest until the marginal product of capital is equal to the user cost of capital or, equivalently, until the net of depreciation marginal product of capital is equal to the cost of capital. King (1974 and 1977) examined investment incentives under a number of possible tax systems. Benge (1998) modifies King's work to take account of Australian tax provisions and derives cost-of-capital expressions for both unincorporated enterprises and companies.

In this section the cost-of-capital expressions of Benge (1998) are used to consider the effects of eliminating accelerated depreciation. Except where otherwise indicated, assumptions are as in the earlier paper and are discussed more fully there. In particular, uncertainty is ignored, it is assumed that all investors are taxed at a uniform rate $m > 0$ and it is assumed that the companies being analysed are widely-held firms owned by Australian non-corporate shareholders.

As was shown in the earlier paper, unincorporated enterprises have incentives to invest until investments generate a real pre-tax rate of return of

$$\rho_u = \frac{(1 - m(k + Z_u))(i(1-m) - \pi + \delta(1+\pi))}{(1-m)(1+\pi)} - \delta \qquad (1)$$

where m is the marginal tax rate of investors, k is the investment allowance (if any), Z_u is the present value of depreciation allowances per dollar of investment discounted at the rate $i(1-m)$, i is the nominal interest rate (assumed to be constant for convenience), π is the (constant) rate of assumed inflation, and δ is the geometric rate at which the real revenues derived from an asset are assumed to decay.

For companies owned by domestic non-corporate shareholders, costs of capital will depend on dividend policy and Benge (1998) discusses a number of possible cases. The tax system will normally provide incentives for domestically-owned firms to distribute franked dividends and to refrain from paying unfranked dividends. The base-case companies considered in that paper are assumed to do this. In this paper when considering domestically-owned companies we restrict our attention to these base-case companies. It is straightforward, however, to extend the analysis to other categories of domestically-owned firms. For base-case companies, if shareholders are taxed at the rate m, the cost of capital is

$$\rho_c = \frac{(1 - c - (m-c)(k + Z_c))(\phi - \pi + \delta(1+\pi)) + b\alpha c\pi}{(1-m)(1+\pi)} - \delta \qquad (2)$$

where c is the accrual-equivalent rate of capital gains tax, Z_c is the present value of depreciation deductions per dollar of investment discounted at the rate $\phi = (i(1-m) - \alpha c\pi)/(1-c)$, b is the proportion of the capital stock which is financed

by debt and α is an expression which takes the value 1 if real gains are taxed and 0 if nominal gains are taxed.

The Ralph Report suggests eliminating accelerated depreciation but not indexing depreciation allowances for inflation. To model this proposal it is assumed that an asset costing a dollar at the end of year 0 with cash flows which decay at rate δ would be allowed a nominal depreciation deduction of δ at the end of year 1, $\delta(1-\delta)$ at the end of year 2, $\delta(1-\delta)^2$ at the end of year 3 and so forth.[7] This depreciation scheme would mirror economic depreciation in the absence of inflation. This means that for an unincorporated enterprise

$$Z_u = \frac{\delta}{1+i(1-m)}\sum_{t=0}^{\infty}\left(\frac{1-\delta}{1+i(1-m)}\right)^t = \frac{\delta}{i(1-m)+\delta} \tag{3}$$

For a company

$$Z_c = \frac{\delta}{1+\phi}\sum_{t=0}^{\infty}\left(\frac{1-\delta}{1+\phi}\right)^t = \frac{\delta}{\phi+\delta} \tag{4}$$

This system of depreciation will be referred to as historical cost non-accelerated depreciation (HCNAD). Assuming, as is currently the case, that there is no investment allowance $(k=0)$, the cost of capital for an unincorporated enterprise becomes

$$\rho_u = \frac{\left(1-\frac{m\delta}{i(1-m)+\delta}\right)\left(i(1-m)-\pi+\delta(1+\pi)\right)}{(1-m)(1+\pi)} - \delta$$

Simplifying

$$\rho_u = r - \frac{im\pi(1-\delta)}{\left(i(1-m)+\delta\right)(1+\pi)} \tag{5}$$

where $r=(i-\pi)/(1+\pi)$ is the real interest rate.

In the absence of inflation, $\rho_u = r$ irrespective of δ. Thus, the tax system would be require the same pre-tax rate of return on all marginal investments acquired by an

unincorporated enterprise. It would be neutral with respect to assets of differing economic lives acquired by unincorporated enterprises. If, however, m and π are both positive, the cost of capital rises with δ.

$$\frac{\partial \rho_u}{\partial \delta} = \frac{im\pi(1+i(1-m))}{(i(1-m)+\delta)^2(1+\pi)} > 0$$

This means that with positive inflation, HCNAD will not be neutral. It will tend to bias investment in favour of assets which depreciate slowly (δ is low). Such investments will be profitable when they generate lower real pre-tax rates of return than are required on investments with higher rates of δ. This property of HCNAD was pointed out by Auerbach (1979).[8] This contrasts with three idealised depreciation schemes discussed in Benge (1998) (nominal economic depreciation, real economic depreciation and immediate deductibility or expensing) where costs of capital would be independent of δ.

It is instructive to consider two polar cases. If real cash flows do not depreciate, $\delta = 0$. In this case

$$\rho_u = r - \frac{m\pi}{(1-m)(1+\pi)} \tag{6}$$

This is the cost of capital for an unincorporated enterprise derived in Benge (1998) (see Table 2) for the case where firms are allowed to claim deductions for real economic depreciation (the fall in the real value of assets). Clearly if δ is zero, real cash flows do not decay over time. If deductions were allowed for the fall in the real value of an asset, no deductions would be allowed because the real value of the asset would remain constant. Under HCNAD no depreciation deductions would be allowed either for such a non-depreciating asset. Thus, for such an asset, real economic income is being taxed.

At the other polar extreme, $\delta = 1$. For such an asset

$$\rho_u = r \tag{7}$$

This is the expression given in Table 2 of Benge (1998) for the case when nominal economic depreciation is deductible and firms are taxed on the full nominal income from an investment. To see this, consider such an investment costing a dollar which generates a real pre-tax rate of return of *r*. If $\delta = 1$, such an investment generates a single positive cash flow one year after it is acquired and then expires. To provide a real pre-tax rate of return of *r*, the nominal cash flow must be $1+\nu$ where $\nu = r(1+\pi)+\pi = i$. As the historical cost of the asset is a dollar, the investor will be able to claim this as a depreciation deduction. Assuming that the asset is financed with the investor's own funds, tax will be $m\nu = mi$. The investor will be left with after-tax wealth of $1+\nu(1-m) = 1+i(1-m)$ and does as well as would have been the case if the dollar were invested in bonds. On such an investment the full nominal economic income is taxable and if the investment generates a real pre-tax rate of return of *r*, it is a breakeven investment.

While expressions are more complex, the same intuition carries over to the case of investment by a company. Under HCNAD the cost of capital for a company becomes

$$\rho_c = \frac{\left(1-c-\frac{(m-c)\delta}{\phi+\delta}\right)(\phi-\pi+\delta(1+\pi))+b\alpha c\pi}{(1-m)(1+\pi)} - \delta$$

This can be simplified to

$$\rho_c = r - \frac{\pi}{1+\pi}\left[\frac{(1-\delta)(m-c)\phi}{(1-m)(\phi+\delta)} + \frac{\alpha c(1-b)}{1-m}\right] \tag{8}$$

Provided $\pi > 0$ and $m > c$, the corporate cost of capital will also rise with δ.[9]

$$\frac{\partial \rho_c}{\partial \delta} = \frac{\pi(m-c)\phi(1+\phi)}{(1+\pi)(\phi+\delta)^2} > 0$$

Once again, it is instructive to examine polar cases. If $\delta = 0$,

$$\rho_c = r - \frac{\pi}{1+\pi}\left[\frac{m-c}{1-m} + \frac{\alpha c(1-b)}{1-m}\right] \tag{9}$$

This is the corporate cost of capital under real economic depreciation provided in Table 3 of Benge (1998). If, on the other hand, $\delta = 1$,

$$\rho_c = r - \frac{\pi\alpha c(1-b)}{(1+\pi)(1-m)} \tag{10}$$

This is the corporate cost of capital under nominal economic depreciation from Table 3 of Benge (1998).

3. Effects of Ralph Proposals on Investment Biases

The Ralph proposals affect costs of capital for unincorporated enterprises and domestically-owned companies in three main ways:

- the removal of capital gains indexation will tend to raise costs of capital;
- reduced taxes on capital gains will tend to reduce costs of capital;
- the elimination of accelerated depreciation will tend to raise costs of capital.

The other major proposal is to reduce the company tax rate to 30 cents in the dollar. This will not affect incentives for firms pursuing a policy of paying as many franked dividends as possible. This is because reduced company tax collections mean increased personal income taxes (ignoring the fact that some shareholders such as those below the tax-free threshold are unable to claim imputation credits at present).[10]

Changes to Capital Gains Taxation

The focus of this paper is on the incentive effects of changes in depreciation provisions. However, as the proposal to remove capital gains tax indexation and to reduce taxes on capital gains will also affect incentives to invest, it is helpful to start by considering the impact of this change alone. In this paper it will be assumed that reduced rates of capital gains taxation involves 80 per cent of capital gains being taxed.

Costs of capital are estimated in Table 1. There are a number of assumptions underlying these estimates. Current depreciation provisions are described in Benge (1998) and the relationship between the rate of economic depreciation, δ, and the set

of assets listed in Table 1 are as in that paper. It is assumed that buildings currently qualify for the 2.5 per cent deduction for 40 years rather than the higher rate of deduction applying to buildings used for eligible industrial activities or short-term traveller accommodation. Other assumptions are as follows:

- shareholders are all taxed at a rate of $m = 0.33$ (the average marginal tax rate of shareholders)[11];
- the real interest rate, *r*, is 5 per cent per annum;
- there is a constant inflation rate of 2.5 per cent per annum which is the midpoint of the Reserve Bank's long-run target range of 2 – 3 per cent;
- 20 per cent of shares are sold each year;
- 40 per cent of a company's capital is financed with debt;[12]
- under current provisions, shareholders believe that there is a 60 per cent probability of real gains accruing, a 30 per cent probability of nominal losses accruing and a 10 per cent chance of real losses but nominal gains accruing.[13]

With the exception of a minor difference in the assumed inflation rate, all these assumptions are as in Benge (1998). While each of these assumptions could be challenged, the general direction of changes reported in Table 1 seems reasonably robust to minor changes in these assumptions.

Costs of capital are reported for equipment with economic lives of 3, 5, 10, 20 and 30 years, for trading stock and for buildings. Results are reported for both companies and unincorporated enterprises.

Table 1 should be interpreted as follows. The figures indicate costs of capital, ie, the real pre-tax rates of return required on various investments. At these real rates of return an investor on a 33 per cent marginal tax rate would earn the same after-tax return as he or she would from investing in bonds which earn a 5 per cent real interest rate.

The capital gains tax changes do not affect costs of capital for unincorporated enterprises under the assumptions of the model where investors are assumed to acquire these assets directly and operate them over their economic lives. Before and after the change in capital gains taxation, investment in 3-year equipment would need to generate a 2.5 per cent real pre-tax rate of return to become marginally profitable.

Investment in 5-year equipment would need to generate a 3.8 per cent real pre-tax rate of return and so forth. Costs of capital are affected, however, for companies. Investors acquire an interest in a company and eventually must sell their interest in the company. When they do so, the capital gains tax impost becomes relevant. The elimination of indexation boosts capital gains taxes that shareholders are required to pay and hence the real pre-tax rates of return required for investment in companies to be marginally profitable.

Table 1 Effects of Changes in CGT Provisions on Costs of Capital

	3-Yr Eqpt	*5-Yr Eqpt*	*10-Yr Eqpt*	*20-Yr Eqpt*	*30-Yr Eqpt*	*Trdg Stock*	*Bldgs*
Unincorp. Ents.							
Current CGT Provisions	2.5	3.8	3.8	3.6	3.3	5.0	4.0
New CGT Provisions	2.5	3.8	3.8	3.6	3.3	5.0	4.0
Difference	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Companies							
Current CGT Provisions	4.0	4.3	4.3	4.3	4.2	4.6	4.4
New CGT Provisions	4.0	4.5	4.5	4.4	4.3	5.0	4.6
Difference	*0.0*	*0.2*	*0.2*	*0.1*	*0.1*	*0.4*	*0.2*

Table 1 indicates that current depreciation provisions do not treat all forms of investment neutrally. Current tax provisions generally tend to favour investment in 3-year equipment and 30-year equipment relative to investment in equipment with lives

of 5- to 20-years, buildings and trading stock. With the exception of trading stock, they also generally tend to favour investment by unincorporated enterprises relative to companies. By themselves, changes to capital gains tax provisions tend to boost corporate costs of capital most for investments which are already more-heavily taxed. They also reinforce the tax bias favouring investment by unincorporated enterprises relative to companies.

Elimination of Accelerated Depreciation

Table 2 indicates the combined effects of the elimination of accelerated depreciation and the changes to capital gains tax provisions on costs of capital for unincorporated enterprises and domestically-owned companies.

Table 2 Overall Effects of Ralph Proposals on Costs of Capital

	3-Yr Eqpt	*5-Yr Eqpt*	*10-Yr Eqpt*	*20-Yr Eqpt*	*30-Yr Eqpt*	*Trdg Stock*	*Bldgs*
Unincorp. Ents.							
Current Provisions	2.5	3.8	3.8	3.6	3.3	5.0	4.0
New Provisions	4.9	4.9	4.7	4.5	4.4	5.0	4.2
Difference	*2.4*	*1.1*	*0.9*	*0.9*	*1.1*	*0.0*	*0.2*
Companies							
Current Provisions	4.0	4.3	4.3	4.3	4.2	4.6	4.4
New Provisions	5.0	5.0	4.9	4.8	4.8	5.0	4.7
Difference	*1.0*	*0.7*	*0.6*	*0.5*	*0.6*	*0.4*	*0.3*

The figures reported in the table suggest that the combination of measures will make costs of capital for the various forms of investment that unincorporated enterprises much more equal than before. A similar pattern is evident in the case of companies. However, as was discussed in section 2, HCNAD would not be completely neutral. There is a bias favouring longer-lived assets such as buildings and 30-year equipment.

Finally, consider costs of capital for a given type of asset. Under current provisions there are major differences between costs of capital for companies and unincorporated enterprises. This is because of the way that current tax provisions end up clawing back the benefits of tax preferences available to companies but not for unincorporated enterprises. Under HCNAD there would be much less difference between costs of capital for unincorporated enterprises and companies. The biggest remaining differences between corporate and unincorporated costs of capital would be for buildings and longer-lived equipment.

The results reported above have all been calculated assuming $m = 0.33$. It was noted that some domestically-owned companies may be acting in the interests of shareholders on more extreme tax rates ($m = 0.15$ or $m = 0.485$). These more extreme tax rates would alter the numbers reported in Table 2 but not the qualitative conclusions. It would still be the case that the combination of measures reduced biases both between the various investments a given firm could undertake and over whether investment was undertaken by unincorporated enterprises or companies. Remaining biases would still favour buildings and longer-lived equipment relative to other assets.

4. Uniform Loadings and the NISH: No Inflation

The Ralph Report's recommendation is that if some form of accelerated depreciation is to be retained, it should consist of a uniform system of loadings. In this section it is shown that this system of accelerated depreciation would not generally be neutral. In the absence of inflation, it would tend to promote investment in shorter-lived assets relative to investment in longer-lived assets. By contrast, however, Harberger's scheme would be neutral.

Uniform Loadings

Suppose that when a dollar of capital is acquired at the end of year 0, tax depreciation is δ* at the end of year 1, $\delta^*(1-\delta^*)$ at the end of year 2, $\delta^*(1-\delta^*)^2$ at the end of year 3 and so forth. In the absence of inflation, the present value of depreciation deductions for an unincorporated enterprise on a dollar of investment will be

$$Z_u = \frac{\delta^*}{r(1-m)+\delta^*} \tag{11}$$

In the absence (or presence) of inflation , the present value of depreciation deductions for a company will be

$$Z_c = \frac{\delta^*}{\phi+\delta^*} \tag{12}$$

To take account of the case of uniform loadings, it will be assumed that

$$\delta^* = (1+\beta)\delta \tag{13}$$

where β is the uniform rate of loading.

Costs of capital for unincorporated enterprises and companies can be found by substituting these values of *Z* into equations (1) and (2) respectively.

Unincorporated Enterprise

Assume as at present that there is no investment allowance ($k = 0$). Substituting (11) into (1) and assuming $\pi = 0$ so $i = r$

$$\rho_u = \frac{\left(1-\frac{m\delta^*}{r(1-m)+\delta^*}\right)\left(r(1-m)+\delta\right)}{1-m} - \delta$$

Simplifying

$$\rho_u = r - \frac{mr(\delta^*-\delta)}{r(1-m)+\delta^*} \tag{14}$$

Substituting (13)

$$\rho_u = r - \frac{mr\beta\delta}{r(1-m)+(1+\beta)\delta} \tag{15}$$

It is straightforward to confirm that provided $\beta > 0$, ρ_u falls with δ which implies that this regime favours investment in shorter-lived assets.

$$\frac{\partial \rho_u}{\partial \delta} = \frac{-mr^2\beta(1-m)}{[r(1-m)+(1+\beta)\delta]^2} < 0$$

Companies

For companies

$$\rho_c = \frac{\left(1-c-(m-c)\dfrac{\delta^*}{\phi+\delta^*}\right)(\phi+\delta)}{1-m} - \delta$$

Observing that $\phi = r(1-m)/(1-c)$ and simplifying

$$\rho_c = r - \frac{(m-c)\phi(\delta^*-\delta)}{(1-m)(\phi+\delta^*)} \tag{16}$$

Substituting (13)

$$\rho_c = r - \frac{(m-c)\phi\beta\delta}{(1-m)(\phi+(1+\beta)\delta)} \tag{17}$$

Provided $c < m$ and $\beta > 0$, uniform loadings would also tend to promote shorter-lived relative to longer-lived investments for companies.

$$\frac{\partial \rho_c}{\partial \delta} = -\frac{(m-c)\phi^2\beta}{(1-m)(\phi+(1+\beta))^2} < 0$$

The NISH

The NISH involves firms being allowed to deduct some fraction, θ, of capital expenditure immediately with the remainder being written off over the economic life

of the asset. In this case a firm acquiring a dollar of capital at the end of year 0 could deduct θ immediately, $(1-\theta)\delta$ at the end of year 1, $(1-\theta)\delta(1-\delta)$ at the end of year 2, $(1-\theta)\delta(1-\delta)^2$ at the end of year 3 and so forth. The present value of deductions for an unincorporated enterprise will be

$$Z_u = \theta + \frac{(1-\theta)\delta}{r(1-m)+\delta} \tag{18}$$

For a company the present value of depreciation deductions will be

$$Z_c = \theta + \frac{(1-\theta)\delta}{\phi+\delta} \tag{19}$$

Unincorporated Enterprises

Once more assuming that there is no inflation and no investment allowance

$$\rho_u = \frac{(1-m)\left[\theta + \frac{(1-\theta)\delta}{r(1-m)+\delta}\right]\left(r(1-m)+\delta\right)}{1-m} - \delta$$

Simplifying

$$\rho_u = r(1-m\theta) \tag{20}$$

This is independent of δ which means that this scheme is neutral with respect to asset life. The intuition is that the NISH is a linear combination of two methods of depreciation, both of which are neutral. It can be seen from Table 2 of Benge (1998) that in the absence of inflation the cost of capital for an unincorporated enterprise would be $\rho_u = r(1-m)$ if capital expenditure could be expensed (ie, deducted immediately). This is true irrespective of the rate of economic depreciation. Table 2 of Benge (1998) also records that the cost of capital would be $\rho_u = r$ under economic depreciation irrespective of the rate of economic depreciation. The NISH provides an outcome which is the weighted average of these two schemes. In the extreme where $\theta = 1$, it is clear that the NISH is equivalent to allowing expensing and from equation

(20) it can be seen that $\rho_u = r(1-m)$. In the opposite extreme where $\theta = 0$, it is clear that the NISH is equivalent to economic depreciation and from equation (20) $\rho_u = r$.

Companies

For companies the cost of capital becomes

$$\rho_c = \frac{\left(1-c-(m-c)\left(\theta+\frac{(1-\theta)\delta}{\phi+\delta}\right)\right)(\phi+\delta)}{1-m} - \delta$$

Simplifying

$$\rho_c = r\left(1-\frac{(m-c)\theta}{1-c}\right) \qquad (21)$$

Again this expression is independent of δ so this scheme would be neutral with respect to asset life. The neutrality of the NISH follows once more from the fact that both expensing and economic depreciation would be neutral with respect to asset lives for corporate investments. As is shown in Table 3 of Benge (1998), the cost of capital under expensing would be $r(1-m)/(1-c)$ and the cost of capital under economic depreciation would be *r*. These expressions can be derived by substituting, respectively, $=1$ and θ 0 into equation (21).

5. Uniform Loadings and the NISH with Positive Inflation

When inflation is positive we have seen in section 2 that HCNAD (ie, allowing capital expenditure to be written off over economic lives) tends to favour longer-lived relative to shorter-lived assets. Expensing continues to be neutral but if a linear combination of expensing and the HCNAD is used, this will relatively favour longer-lived assets. We will assume that applying the NISH in the presence of inflation involves a linear combination of expensing and the HCNAD and so produces this bias.[14] This means that while the neutrality properties of the NISH make this seem attractive relative to uniform loadings in the absence of inflation, there are no a priori

grounds for concluding that the NISH is more neutral than uniform loadings in the presence of inflation. This section shows that the opposite may be the case.

In chapter 39 of the Ralph Report uniform loadings of either 20 per cent or 50 per cent are proposed. These have similar effects on average to allowing, respectively, 10 per cent or 25 per cent of capital expenditure to be expensed with the remainder subject to HCNAD.[15]

Table 3 presents estimates of costs of capital for a 20 per cent uniform loading (denoted by UL) and for the NISH where 10 per cent of capital expenditure can be expensed. Results are reported for unincorporated enterprises and domestically-owned companies for inflation rates of 0, 1, 2 and 3 per cent per annum. Other key assumptions are as follows: the real interest rate, *r*, is 5 per cent per annum; the marginal tax rate of shareholders, *m*, is 33 per cent; nominal gains are taxed but only 80 per cent of such gains are taxable; and that 20 per cent of shares are sold each year. The real interest rate is assumed to remain constant despite there being different possible rates of inflation which implies that an unmodified Fisher relationship is assumed to hold.

In the case where there is no inflation, the NISH would be neutral across assets with different economic lives while uniform loadings would introduce a bias favouring shorter-lived assets as was discussed in section 4. However, biases introduced by uniform loadings seem extremely small. In these examples it is assumed that accelerated loadings or the NISH are not extended to trading stock. It is unclear how accelerated loadings could be extended to trading stock. It would, however, be quite straightforward to extend the NISH to trading stock by requiring firms to include only 90 per cent of the value of stock on hand when reporting assessable income. If the NISH were extended to trading stock and there were no inflation, all costs of capital would be 4.8 per cent for unincorporated enterprises and 4.9 per cent for companies.

Table 3 Costs of Capital under 20 Per Cent Uniform Loading and Under a 10 Per Cent NISH

	3-Yr Eqpt	*5-Yr Eqpt*	*10-Yr Eqpt*	*20-Yr Eqpt*	*30-Yr Eqpt*	*Trdg Stock*	*Bldgs*
$\pi = 0$							
UL: UEs	4.7	4.7	4.8	4.8	4.8	5.0	4.9
UL: Companies	4.9	4.9	4.9	4.9	4.9	5.0	5.0
NISH: UEs	4.8	4.8	4.8	4.8	4.8	5.0	4.8
NISH: Companies	4.9	4.9	4.9	4.9	4.9	5.0	4.9
$\pi = 0.$							
	4.7	4.7		4.6	4.6		4.6
UL: Companies		4.9	4.9		4.9	5.0	
NISH: UEs		4.8	4.7		4.6	5.0	
NISH: Companies	4.9		4.9	4.9		5.0	4.8
$\pi = .02$							
UL: UEs	4.6	4.6	4.5	4.4	4.4	5.0	4.3
UL: Companies	4.8	4.8	4.8	4.8	4.8	5.0	4.7
NISH: UEs	4.7	4.7	4.6	4.5	4.4	5.0	4.2
NISH: Companies	4.9	4.9	4.8	4.8	4.8	5.0	4.7
$\pi = 0.03$							
UL: UEs	4.5	4.5	4.4	4.2	4.1	5.0	3.9
UL: Companies	4.8	4.8	4.7	4.7	4.7	5.0	4.6
NISH: UEs	4.7	4.6	4.4	4.2	4.1	5.0	3.9
NISH: Companies	4.9	4.8	4.8	4.7	4.6	5.0	4.6

While tax provisions might be slightly more neutral under the NISH than under uniform loadings with no inflation, this result no longer holds if there is ongoing inflation of as little as 1 per cent per annum. With 1, 2 or 3 per cent inflation, the spread of costs of capital are never lower and often higher than under the NISH. It is also clear that with as little as 1 per cent per annum inflation, uniform loadings no longer provide a bias favouring shorter-lived assets. The bias is reversed and longer-lived assets become relatively advantaged.

The Reserve Bank long-run target for inflation is in the range 2 – 3 per cent per annum. At these sorts of rates, it would seem from the figures presented in Table 3 that the Ralph Report proposal of uniform loadings would be at least as neutral as the NISH.

The figures suggest, however, that if a system of uniform loadings were introduced, longer-lived equipment and buildings would be relatively advantaged. There may be a case for a higher rate of loading for shorter-lived equipment and a smaller or zero loading for buildings and longer-lived equipment. Trading stock would appear to be relatively disadvantaged and there might be some case for providing some tax relief, perhaps by requiring firms to only include some proportion (say 90 per cent) of the cost of trading stock when reporting taxable income.

6. Concluding Comments

This paper has focussed on the neutrality properties of eliminating accelerated depreciation or of allowing a system of uniform loadings. Both of these have been proposed as options in the Ralph Report.

The paper has shown that eliminating accelerated depreciation entirely would not be neutral with positive inflation. It would tend to favour longer-lived relative to shorter-lived assets. However, biases would tend to be small compared with current biases if inflation is in the Reserve Bank target range of 2 – 3 per cent per annum. In the absence of inflation a system of uniform loadings would not be neutral (despite suggestions to the contrary in the Ralph Report). Shorter-lived assets would be favoured. However, even at very low rates of inflation this bias can be reversed and longer-lived assets may become favoured.

In the absence of inflation, there would be a preferable method of providing accelerated depreciation to allowing uniform loadings. This is to allow some fraction of capital expenditure to be expensed and the remainder to be subject to economic depreciation. At very low rates of inflation, however, this system may end up being less neutral than the system of uniform loadings proposed in the Ralph Report. This does not mean, however, that a system of uniform loadings is the most neutral option available. A preferable option might be to provide no loading or a smaller loading for buildings and/or longer-lived equipment and a higher loading for shorter-lived equipment. It might also be desirable to require firms to include only a fraction of the cost of trading stock when reporting taxable income.

This paper has focussed solely on the neutrality properties of HCNAD, a system of uniform loadings and the NISH. A key issue which has not been addressed is how winding back accelerated depreciation provisions can affect the overall level of capital taxation and Australia's aggregate capital stock. Benge (1999) has shown that small levels of taxes on capital can impose high marginal excess burdens. The efficiency implications of changing the overall level of capital taxation could possibly be more important than the neutrality issues which have been examined in this paper. However, assessing the effects of the Ralph Report's proposals on the overall level of capital taxation is a complex task and is left for further work.

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[1] See Ralph et al (1999, p. 106 and pp. 115-123).

[2] See Ralph et al (1999, p. 122).

[3] Table B.2 on p. 106 of Ralph et al (1999) converts current depreciation provisions to percentage loadings. It is also clear from the discussion here that it is differences in these percentage loadings which are considered to be a major problem of current provisions.

[4] For example in Table 6 of Benge (1998) it is reported that if the real interest rate is 5 per cent per annum, the inflation rate is 2 per cent per annum and investors are taxed at a rate of 33 per cent, investment by an unincorporated enterprise in 5-year or 10-year equipment would need to generate a real pre-tax rate of return of 3.9 per cent to be marginally profitable. On the other-hand a lower real pre-tax rate of return of 3.4 per cent would suffice for investment in 30-year equipment.

[5] In our model a constant geometric rate of economic depreciation, δ, will be assumed. In the context of this model, talking of shorter- and longer-lived assets is perhaps something of a misnomer inasmuch as strictly all assets are infinitely lived. However, if δ is high, virtually all earnings of consequence

will be in early years and it is convenient to talk of these assets as being shorter-lived. If, δ is low, earnings of consequence will be derived in later years and it is convenient to talk of these assets as being longer-lived.

[6] Real economic depreciation would allow a deduction for the real fall in market value of assets and nominal economic depreciation would allow a deduction for the nominal fall. For further discussion see Benge (1998).

[7] It should be noted that this abstracts from the important difficulty of the Commissioner of Taxation measuring the economic depreciation rate of an asset, δ, and incorporating this in a schedule of permissible depreciation rates. Because of this practical difficulty, schedule rates will always depart from economic depreciation and investment biases are almost certain to be larger than is suggested in this paper.

[8] This does not necessarily mean that user costs of capital will fall for longer-lived assets relative to shorter-lived assets as is discussed by Kopke (1981). Nor does it mean that if the rate of economic depreciation is a choice variable, equipment will necessarily become longer-lived as the inflation rate increases as is discussed by Abel (1981). All that is being said is that in the presence of inflation longer-lived assets would be marginally profitable when they provide lower real pre-tax rates of return than shorter-lived assets.

[9] There are two reasons why c might be less than m. First, because capital gains are taxed when shares are sold rather than as gains accrue, the benefits of tax deferral will normally ensure that the effective rate of capital gains tax is less than the statutory rate. Second, under proposals put forward in the Ralph Report capital gains may be taxed at less than the full statutory rate.

[10] Note that this conclusion rests on the critical assumption outlined earlier that shareholders are all domestic residents. If shareholders were non-residents, the reduction in the company tax rate could have important effects.

[11] This average marginal tax rate comes from Benge (1998). There is no strong theoretical reason for expecting firms to optimise for shareholders on the mean tax rate of shareholders. Many more shares

are held by superannuation funds (taxed at 15 per cent) and individuals on the top marginal tax rate (48.5 per cent) than by those close to the mean marginal tax rate and some firms may be acting in the interests of shareholders on these more extreme rates. Using these more extreme rates would change the magnitudes but not the general direction of the results reported in this paper.

[12] This affects costs of capital under current provisions but not under new provisions. With the elimination of capital gains tax indexation, the cost of capital becomes independent of the proportion of debt financing.

[13] The effect of this assumption is that there will be a 60 per cent chance of real gains being taxed, a 30 per cent chance of nominal gains being taxed and a 10 per cent chance of no capital gain tax under existing provisions as is discussed in Benge (1998). This assumption has no effect on costs of capital under new provisions because capital gains tax is no longer indexed.

[14] Applying a linear combination of expensing and either the system of real economic depreciation or of nominal economic depreciation discussed in Benge (1998) would, by contrast, involve a linear combination of two neutral schemes which would itself be neutral. This would be more in spirit with Harberger's NISH and the nonneutralities discussed in the text should not be seen as a critique of Harberger's scheme. It is a critique of combining expensing with HCNAD.

[15] In this paper results are presented only for the effects of a 20 per cent uniform loading and the NISH with 10 per cent expensing. A comparison of the cases of a 50 per cent uniform loading with a NISH with 25 per cent expensing provides qualitatively similar results.